

**STATE OF HAWAII**  
**DEPARTMENT OF LAND AND NATURAL RESOURCES**  
**DIVISION OF AQUATIC RESOURCES**  
1151 PUNCHBOWL STREET, ROOM 330  
HONOLULU, HAWAII 96813

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CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT

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ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES  
BOATING AND OCEAN RECREATION  
BUREAU OF CONVEYANCES  
CONSERVATION AND RESOURCES ENFORCEMENT  
ENGINEERING  
FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
KAHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS  
WATER RESOURCE MANAGEMENT

January 12, 2007

Board of Land and Natural Resources  
State of Hawai'i  
Honolulu, Hawai'i

**SUBJECT:** Enforcement Action Involving Violations of Northwest Hawaiian Islands Research, Monitoring, and Education Permit # *DLNR.NWHI06R008* by Dr. Greta Aeby of the Hawai'i Institute of Marine Biology

**SUMMARY:** This submittal recommends that the Board place Dr. Greta Aeby on notice that the Board shall deny all permit applications requesting access to the Northwest Hawaiian Islands Marine Refuge submitted by or including Dr. Aeby for a period of one (1) year from the date this submittal is approved.

**DATE OF INCIDENT(s):** May 23-24 & May 30, 2006

**AGAINST:** Dr. Greta Aeby, Hawai'i Institute of Marine Biology

**PREPARED BY:** Blaine Rogers, Legal Fellow, Division of Aquatic Resources

## **I. BACKGROUND**

On March 10, 2006, Dr. Greta Aeby of the Hawai'i Institute of Marine Biology ("HIMB") applied for a Research, Monitoring, and Education Permit ("the permit") in order to enter and harvest in the Northwest Hawaiian Islands Marine Refuge ("NWHI"). The purpose of the permit was to allow Dr. Aeby and her staff to perform research on fish and coral disease in the NWHI. See Exhibit B, Dr. Aeby's permit application, at p. 7. Dr. Aeby's application proposed to re-survey permanent monitoring sites established at French Frigate Shoals in 2005, as well as to establish 2-4 new permanent sites for future monitoring purposes. See Exhibit B, pp. 5-8.

In response to concerns raised by Division of Aquatic Resources' ("DAR") staff and a Native Hawaiian cultural practitioner, DAR staff met with Dr. Aeby and other HIMB researchers on April 12, 2006 to discuss the permit application. At this meeting, Dr. Aeby addressed these concerns and assured DAR staff that utmost care would be taken in sampling and that **all collected samples would be killed by freezing** aboard the National Oceanic and Atmospheric Administration ("NOAA") research vessel, the *Hi'ialakai*. See Exhibit B at p. 2.

On April 28, 2006, the Board of Land and Natural Resources ("the Board") approved Dr. Aeby's permit application, subject to stated conditions attached as an appendix.<sup>1</sup> Permit Condition Number 29 ("condition #29") stated that: "[n]o live organisms of any kind will be transported within, or outside of, the NWHI State Refuge waters. Samples will be killed by freezing, immersion in ethanol, or other acceptable means." (Emphasis added.) See Exhibit A at p. 9.

On May 23, 2006, *Hi'ialakai* Chief Scientist and NOAA's NWHI Marine National Monument Research Coordinator Dr. Randall Kosaki realized that Dr. Aeby had transported a coral sample from French Frigate Shoals ("FFS") to Gardner Pinnacles ("Gardner"), and back to FFS on May 25, 2006. See Exhibits C & D. This sample was transported within an open, flow through system, with the discharge going over the side of the holding tank. See Exhibit D. Dr. Kosaki instructed Dr. Aeby to close off the seawater system of the tank while the vessel was at Gardner and requested that Dr. Aeby return the sample to an area of suitable habitat upon return to FFS. Id. On the morning of May 25, 2006, Dr. Aeby replaced the live coral on a reef near its collection site. Id.

On or about May 30, 2006, Dr. Kosaki and Dr. Zamzow observed that Dr. Aeby and/or her staff were culturing live bacteria from colonies of diseased corals. Id. Dr. Kosaki contacted Dr. Jo-Ann Leong, HIMB Director, and Aulani Wilhelm, the NWHI Coral Reef Ecosystem Reserve Acting Coordinator, to discuss the situation. Dr. Leong sent an email to Dr. Aeby on May 31, 2006, instructing her to cease culturing live samples and to kill the existing ones by freezing. See Exhibit E. Dr. Aeby immediately complied with this instruction. On June 11, 2006, Dr. Kosaki received an email from DAR staff Athline Clark requesting that the frozen samples be immersed in bleach to ensure no transfer of pathogens. See Exhibit F. Dr. Kosaki relayed this message to Dr. Aeby, who once again fully complied.

## II. LEGAL AUTHORITY

The Board may issue permits to enter the NWHI, so long as the permitted activities do not harm or degrade the coral reef ecosystem or related marine resources and species. Hawai'i Administrative Rules ("HAR") §§ 13-60.5-5 & 6. Permits may be issued for: (1) scientific and educational purposes; (2) non-extractive purposes undertaken to further knowledge of resources or which provide for enhanced protection of the resources; (3) subsistence, traditional, and customary Native Hawaiian practices. HAR § 13-60.5-5.

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<sup>1</sup> Permit number *DLNR.NWHI06R008* was valid from May 5 through June 12, 2006.

In order to issue a permit, the Board must assure that the applicant has submitted a complete application and that the public has had an opportunity to comment on the proposed permit. HAR § 13-60.5-6. Furthermore, when reviewing an application, the Board:

**shall** consider whether the applicant has violated or not complied with any term or condition of previous permits issued by the board. . . . The board **shall deny** an application based on a past violation or non-compliance with any term or condition of a permit issued under this chapter; and [a]pproval may be granted by the board after an assessment of the appropriateness of the activity described in the application based on: [f]actors that the board and department consider relevant to section 13-60.5-1, the intent and purpose of this chapter. . . . Id. (Emphasis added and internal numbering deleted.)

The permit issued to Dr. Aeby specified that collection of samples was allowed but subject to the terms and conditions of the permit, which were included as Attachment 1. See Exhibit A at pp. 2-3. Included in these conditions was condition #29, which stated that all samples collected pursuant to the permit would be killed by appropriate means and that no organisms would be transported within or outside of the NWHI waters. Id. at p. 8. Dr. Aeby signed the permit, under an acknowledgment section that read: “[b]y my signature below, I attest that **I understand the general conditions attached to this NWHI Special Activity Permit No. DLNR.NWHI.06.R008.** Further, **I agree to abide by all of these conditions** when undertaking research, monitoring, and educational activities under authority of this permit.” Id. at p. 4. (emphasis added).

### III. DISCUSSION

Dr. Aeby violated condition #29 twice during the course of her permit. First, Dr. Aeby transported a live organism both within and outside of the NWHI refuge waters when she took a live coral sample from FFS to Gardner and back to FFS on May 23 and 24, 2006.<sup>2</sup> This action was witnessed and documented by Dr. Kosaki and Dr. Zamzow, the NWHI Research Coordinator for the Division of Aquatic Resources. As previously established, condition #29 prohibits transportation of live organisms “within, or outside of, the NWHI State Refuge waters.”

Second, Dr. Aeby violated condition #29 when she cultured live bacteria derived from diseased coral samples. Once again, this activity was witnessed by staff members aboard the *Hi`ialakai*, including Dr. Kosaki and Dr. Zamzow. See Exhibits C and D. Condition #29 explicitly states that all samples

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<sup>2</sup> State refuge waters extend 3 nautical miles seaward from each land mass within the NWHI, except Midway. See HAR § 13-60.5-2. Thus, assuming the vessel was originally within NWHI state refuge waters, transit between FFS and Gardner constitutes transport both within and outside of state NWHI waters.

**will be killed** by appropriate means. Not only did Dr. Aeby fail to kill some of the diseased coral specimens that she collected, but she actually cultured these organisms.<sup>3</sup>

These two incidents represent significant breaches of the permit issued to Dr. Aeby. Violations of permits issued under HAR § 13-60.5-6 may subject the responsible party to criminal and/or civil sanctions under Hawai'i Revised Statutes ("HRS") §§ 187A-12.5, 187A-13, and 188-70. Under HRS § 187A-12.5, the Board may assess a fine of up to \$1,000 for a first violation and up to \$2,000 for a second violation. Under HRS § 187A-13, any person who is found guilty of violating a rule of the department for which there is no penalty provided has committed a petty misdemeanor and, pursuant to HRS § 188-70, shall be punished for a first conviction by a fine of not more than \$500 or by imprisonment of up to thirty days.

Notwithstanding these available remedies, staff instead recommends that the Board place Dr. Aeby on notice that the Board shall deny all permit applications requesting access to the NWHI submitted by or including Dr. Aeby for a period of one year from the date this submittal is approved. This recommendation is made based on the considerations discussed below.

First, Dr. Aeby either knew or reasonably should have known that the two incidents described above constituted violations of her permit. Condition #29 is incorporated as part of the permit and Dr. Aeby signed the permit under language indicating that she understood this to be the case. Furthermore, at the April 12, 2006 meeting, Dr. Aeby assured DAR staff that all samples would be killed by freezing, indicating that she had knowledge that live samples were not permitted on board the research vessel. Lastly, Dr. Aeby, in her own permit application, checked the box indicating that no organisms would be kept alive following collection. See Exhibit B at p. 6.

Second, because the permitting process is at its nascent stage and the NWHI has recently been accorded national monument status, these violations should be strongly addressed by the Board in order to insure future compliance by permittees. It is well established by now that the NWHI is an invaluable resource for both the state of Hawai'i and its federal partners. Protection of the NWHI has been the subject of attention and action at the highest levels of the federal government. While the knowledge gained from Dr. Aeby's research is a valuable component in the preservation of the NWHI, staff believes that it is even more important to send a message to all those interested in pursuing scientific, educational, or cultural interests in the NWHI that permit conditions must be strictly obeyed. By taking action on these violations, the Board effectively meets its mandate of managing, preserving, protecting, and conserving the unique resources in the NWHI. HAR § 13-60.5-1.

Third, staff believes that Dr. Aeby's cooperation and valued role as a research partner weighs against criminal or civil penalties. As previously mentioned, Dr. Aeby fully complied with all instructions once the violations were discovered. Staff believes that this cooperation, when viewed in light of the seriousness of the violations and the significance of the resource, makes the proposed remedy an appropriate one.

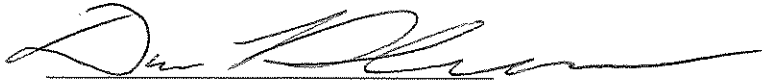
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<sup>3</sup> "Culture" is defined at [www.dictionary.reference.com](http://www.dictionary.reference.com) as "to grow (microorganisms, tissues, etc.) in or on a controlled or defined medium."

#### IV. RECOMMENDATION

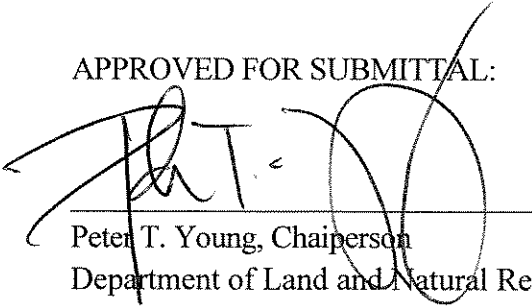
Based on these considerations, staff recommends that the Board place Dr. Aeby on notice that the Board **shall deny** all permit applications requesting access to the NWHI submitted by or including Dr. Aeby for a period of **one (1) year** from the date this submittal is approved.

Respectfully Submitted,



Dr. Dan Polhemus, Administrator  
Division of Aquatic Resources

APPROVED FOR SUBMITTAL:



Peter T. Young, Chairperson  
Department of Land and Natural Resources

LINDA LINGLE  
GOVERNOR OF HAWAII



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HISTORIC PRESERVATION  
KAHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS

<i>For Office Use Only</i>
Permit No: <i>DLNR.NWHI06R008</i>
Issue date: 05/05/06
Expiration date: 06/12/06
Date Appl. Received: 04/10/06
Appl. Fee received: N/A
NWHI Permit Review Committee date: N/A
Board Hearing date: 04/28/06
Post to web date: N/A

**Northwestern Hawaiian Islands State Marine Refuge  
Scientific Research, Monitoring, and Education Permit**

The Board of Land and Natural Resources hereby grants a *Scientific Research, Monitoring and Education Permit* under Hawai'i Administrative Rules, Chapter 60.5 Northwestern Hawaiian Islands Marine Refuge to:

**Project Leader/Permittee:**

*Dr. Greta Aeby*  
*Assistant Researcher*  
*Hawaii Institute of Marine Biology*  
*P. O. Box 1346*  
*Kaneohe, HI 96744*

**Time Period:**

This permit will cover scientific research activities undertaken from May 18 through June 12 from the support vessel Hi'ialakai.

**Permitted Activities:**

The permittee (and any assistants designated in Attachment 2) are authorized to:

- ☒ *Enter the NWHI Marine Refuge waters*
- ☒ *Take (harvest)*
- ☒ *Possess*

**EXHIBIT A**

- ☒ *Transport (Inter-island)*
- ☒ *Interactions with Live Coral*
- ☒ *Other activities:*

- 1) Monitoring of current permanent coral transects at FFS, including coral tagging and photography, as specified in the permit application.
- 2) The placement of 6 steel pins each for the establishment of 2-4 additional *Acropora* transects at FFS, as outlined in the permit application. Coral tagging and photography of these transects is allowed.
- 3) The take of fishes, up to 20 of each species specified below.
- 4) The take of non-lethal coral biopsies specified below.

#### **Permitted Locations:**

NWHI State Marine Refuge (0-3 miles) waters surrounding:

- ☒ Nihoa Island
- ☒ French Frigate Shoals (FFS)
- ☒ Gardner Pinnacles

#### **Collection of Specimens:**

Collection of specimens shall be allowed, subject to the Terms and Conditions of the permit, in the numbers, sizes and locations stipulated in the following tables. Coral samples will be shared among the following permittees: Toonen, Gates, Aeby, Karl, and Rappé. If diseased corals are encountered for any species: If sample size is less than 30, sample size will be increased to 30 (10 each site) and if chip size is 2 cm<sup>2</sup>, chip size will be increased to 6 cm<sup>2</sup>. Coral collectors will be working in close coordination with one another. One team will collect large (6 cm<sup>2</sup>) samples, the other team will collect small (2 cm<sup>2</sup>) samples. They will communicate to ensure that oversampling does not occur.

<b>Coral species</b>	<b>Site</b>	<b>number</b>	<b>size</b>
<i>Acropora cytherea</i>	FFS	50	6 cm <sup>2</sup>
<i>Acropora cytherea</i>	FFS	450	2 cm <sup>2</sup>
<i>Acropora cytherea</i>	Nihoa	50	6 cm <sup>2</sup>
<i>Acropora cytherea</i>	Gardner	50	6 cm <sup>2</sup>
<i>Acropora nasuta</i>	FFS	5	2 cm <sup>2</sup>
<i>Acropora nasuta</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Acropora nasuta</i>	Gardner	5	2 cm <sup>2</sup>
<i>Acropora paniculata</i>	FFS	5	2 cm <sup>2</sup>
<i>Acropora paniculata</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Acropora paniculata</i>	Gardner	5	2 cm <sup>2</sup>
<i>Pocillopora damicornis</i>	FFS	5	2 cm <sup>2</sup>
<i>Pocillopora damicornis</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Pocillopora damicornis</i>	Gardner	5	2 cm <sup>2</sup>
<i>Pocillopora meandrina</i>	FFS	50	6 cm <sup>2</sup>

<i>Pocillopora meandrina</i>	Nihoa	50	6 cm <sup>2</sup>
<i>Pocillopora meandrina</i>	Gardner	50	6 cm <sup>2</sup>
<i>Pocillopora eydouxi</i>	FFS	5	2 cm <sup>2</sup>
<i>Pocillopora eydouxi</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Pocillopora eydouxi</i>	Gardner	5	2 cm <sup>2</sup>
<i>Porites lobata</i>	FFS	450	2 cm <sup>2</sup>
<i>Porites lobata</i>	FFS	50	6 cm <sup>2</sup>
<i>Porites lobata</i>	Nihoa	50	6 cm <sup>2</sup>
<i>Porites lobata</i>	Gardner	50	6 cm <sup>2</sup>
<i>Porites brighami</i>	FFS	5	2 cm <sup>2</sup>
<i>Porites brighami</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Porites brighami</i>	Gardner	5	2 cm <sup>2</sup>
<i>Porites lichen</i>	FFS	5	2 cm <sup>2</sup>
<i>Porites lichen</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Porites lichen</i>	Gardner	5	2 cm <sup>2</sup>
<i>Montipora capitata</i>	FFS	450	2 cm <sup>2</sup>
<i>Montipora capitata</i>	FFS	50	6 cm <sup>2</sup>
<i>Montipora capitata</i>	Nihoa	50	6 cm <sup>2</sup>
<i>Montipora capitata</i>	Gardner	50	6 cm <sup>2</sup>
<i>Montipora patula</i>	FFS	5	2 cm <sup>2</sup>
<i>Montipora patula</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Montipora patula</i>	Gardner	5	2 cm <sup>2</sup>
<i>Leptastrea bewickensis</i>	FFS	5	2 cm <sup>2</sup>
<i>Leptastrea bewickensis</i>	Nihoa	5	2 cm <sup>2</sup>
<i>Leptastrea bewickensis</i>	Gardner	5	2 cm <sup>2</sup>
<i>Pavona varians</i>	FFS	50	6 cm <sup>2</sup>
<i>Pavona varians</i>	Nihoa	50	6 cm <sup>2</sup>
<i>Pavona varians</i>	Gardner	50	6 cm <sup>2</sup>
<i>Fungia scutaria</i>	FFS	50	6 cm <sup>2</sup>
<i>Fungia scutaria</i>	Nihoa	50	6 cm <sup>2</sup>
<i>Fungia scutaria</i>	Gardner	50	6 cm <sup>2</sup>
<i>Tubastraea coccinea</i>	FFS	50	2 cm <sup>2</sup>
<i>Tubastraea coccinea</i>	Nihoa	50	2 cm <sup>2</sup>
<i>Tubastraea coccinea</i>	Gardner	50	2 cm <sup>2</sup>

#### Fish collections:

Fish may be collected from French Frigate Shoals, Nihoa, or Gardner Pinnacles. A maximum of twenty individuals of any of the following species is allowed, and fish samples will be shared with Dr. Brian Bowen (Permit # *DLNR.NWHI06R004*).

#### Fish Species:

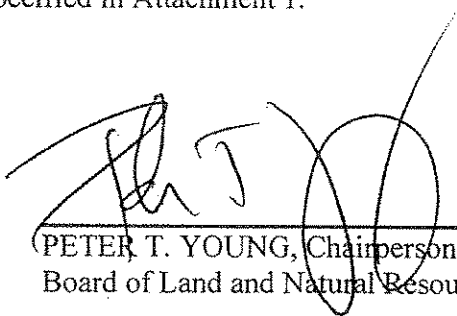
*Ctenochaetus strigosus*  
*Lutjanus kasmira*  
*Mulloidichthys flavolineatus*  
*Mulloidichthys pfluegeri*  
*Mulloidichthys vanicolensis*



*Parupeneus multifasciatus*  
*Parupeneus pleurostigma*

**Permit Conditions**

This permit is subject to the Permit Conditions specified in Attachment 1.

  
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PETER T. YOUNG, Chairperson  
Board of Land and Natural Resources

cc: ( ) DOCARE  
USFWS, Honolulu  
NMFS, Honolulu  
NWHCRER, Honolulu

**SIGNATURE AND ACKNOWLEDGEMENT**

By my signature below, I attest that I understand the general conditions attached to this NWHI Special Activity Permit No. DLNR.NWHI06R008. Further, I agree to abide by all of these conditions when undertaking research, monitoring, and educational activities under authority of this permit.

Project Leader/Permittee:   
\_\_\_\_\_  
Greta Aeby, Ph. D.  
Assistant Researcher  
Hawaii Institute of Marine Biology

## Attachment 1

### SCIENTIFIC RESEARCH AND MONITORING PERMIT CONDITIONS

1. This permit does not make the Board of Land and Natural Resources or the State of Hawai'i liable in any way for any claim of personal injury or property damage to the permittee or assistants which may occur during any activity authorized by this permit; moreover, the permittee and all assistants agree to hold the State harmless against any and all claims of personal injury, death or property damage resulting from activities of the permittee or any assistant.
2. This permit conveys a privilege to engage in activities within State waters under the jurisdiction of the Division of Aquatic Resources (DAR). The permittee is responsible for complying with all applicable County, State, and Federal requirements.
3. The permittee and other personnel are individually responsible and accountable for their actions while conducting activities authorized under this permit. Additionally, the permittee is responsible and accountable for the actions of the permittee's assistants.
4. This permit is not transferable or assignable. Any person whose name does not appear on this permit and is conducting any activity described herein is subject to prosecution for violations of State Laws. The permit holder must abide by all provisions set out in the permit as well as other applicable regulations.
5. Permitted activities must be conducted with adequate safeguards for the environment. To the extent possible, the environment shall be restored to its existing condition prior to the cessation of the permitted activity.
6. Permits must be carried aboard vessels and made available on request for inspection by DLNR or USFWS Refuge or Enforcement personnel. For in-water activities, it is recommended that a copy of the permit be laminated and available for display at all times, in addition to copies held by personnel and aboard the major form of transport into the Reserve.
7. All private vessels used to access the NWHI Marine Refuge must carry a minimum amount of Wreck Removal and Pollution insurance, specifically targeted and sufficient to provide for the vessel's full extraction and removal from the NWHI should it run aground or experience difficulties. The extraction method used must meet with the approval of DLNR and any other appropriate State or Federal resource trustees.
8. Any vessel causing damage to marine resources within the refuge may be subject to citation from DLNR and fines from the Board of Land and Natural Resources.
9. Recent concerns over the proliferation of alien algae in the main Hawaiian Islands have resulted in the need for a strong effort on the part of any visitor that conducts activities in the pristine waters of the NWHI to insure that they do not serve as vectors for the accidental introduction of these species. The minimum successful fragmentation size for at

least two of the concerned algal species is less than 1 cm. DLNR requires that all activities in State waters in the NWHI take all steps necessary to eliminate the possibility of accidentally transferring these (and other) harmful species into new ecosystems where they might gain a foothold. As such, DLNR has developed a set of requirements for all divers and snorkelers to follow prior to departure for the NWHI:

- a. Unzip and open all pockets on buoyancy compensators, dive bags and wet suits
  - b. Submerge and soak all dive gear (including dive bags) and transecting gear for a minimum of 24 hours in 100% fresh water
  - c. Thoroughly dry and then visually inspect all gear prior to departure for NWHI
  - d. Any algal pieces must be removed and discarded prior to departure
10. All tenders and dive boats (inflatables, whalers), engines, anchor lines, etc. will be visually inspected for any algal remnants or other alien species which must be removed prior to departure for the NWHI. If necessary, the vessels must be washed and fumigated prior to departure from the main Hawaiian Islands. This inspection is in addition to the overall vessel inspection mentioned above.
  11. The same procedure above is required of all expeditions traveling to multiple islands within the NWHI. If drying and inspection occur after departure then the algal pieces must be retained in sealed containers until they can be disposed of back on O'ahu. Extreme care must be taken to kill these specimens (freshwater soak for 24 hours followed by drying and placement in sealed containers) during transport.
  12. All participants (including crew) in a permitted activity or aboard a permitted mode of transport will abide by the non-harassment of protected and unique marine wildlife policy. This includes staying away from Hawaiian monk seals and sea turtles, and minimize disturbance to assemblages of large apex predators such as jacks, sharks or grouper.
  13. In accordance with Federal and State Laws, there will be no intentional release of sewage from the transport vessel during the permitted expedition. All sewage will be held in a proper storage tank until it can be off-loaded to proper handling facilities.
  14. Tenders will be outfitted with EPA omissions approved outboard engines that meet the latest environmental standards.
  15. Refueling of tenders and all small vessels will be done at the mother ship and outside the confines of the lagoons or near-shore waters.
  16. Tender and dive vessels will operate at slow speed and with a bow lookout in shallow water NWHI coral reef areas in order to minimize prop or bow damage to three dimensional coral reef habitat or endangered monk seals or sea turtles.
  17. Anchoring:

-- Permitted Transport Vessel

It is illegal to anchor on living coral reef areas in the NWHI. Transport vessels will endeavor to anchor as far offshore as possible and will try to pre-determine anchorages prior to departure.

-- Tenders and Dive Vessels

It is illegal to anchor on living coral reef areas in the NWHI while conducting inshore operations. In those areas where anchoring needs to occur adjacent to living coral resources, placement and retrieval of the anchor will be done by hand whenever this procedure can be done in a safe and prudent manner.

18. The permittee may request changes to the permit. Any such request to make changes to the permit must be made in writing and received by DAR at least two weeks prior to the change, except in cases of emergencies. No change may be implemented without written approval from DAR. In this manner, the permittee may request to:
  - a. add assistants to the permit;
  - b. add another permittee or be replaced by another permittee
  - c. make changes to the activities allowed under this permit
19. This permit expires on the date indicated on Page 1.
20. This permit is not to be used for nor does it authorize the sale of collected organisms. The research activity must be non-commercial and will not involve the sale of any organism, byproduct, or material collected. Furthermore, any resources or samples collected are a public trust, and are not to be used for sale, patent, bioassay, or bio-prospecting, or for obtaining patents or intellectual property rights.
21. Permit holders agree to submit a project report and cruise log to DLNR within 30 days after returning to Honolulu. The project report will be a brief (1-2) page statement summarizing the results of permitted activities. A cruise log shall list the days spent in the Marine Refuge, activities carried out, approximate positions, and general observations. Permit holders must also provide DLNR with project summaries, GPS locations, visuals, technical reports, and/or catch reports (if applicable) for activities undertaken while in the NWHI Marine Refuge as specified in the conditions of their individual permit.
22. Permit holders shall agree to **immediately** report to DLNR observation of any impacts to the marine resources, whether directly caused by their activities or not. This includes observations of activities conducted by other parties along with both natural and anthropogenic events. Permittees provide a valuable role as 'eyes and ears' on the water. All recorded observations by permittees will provide additional information and assist with management of the refuge. Such reporting shall include full documentation with notes, logs, photos, GPS, and other information as may be required.
23. The permittee and assistants agree to provide access to data obtained under authority of this permit upon request of DAR and to provide to the Division a copy of each published

report prepared with data obtained under this permit. The permittee agrees to provide the DAR access to organisms obtained and held under this permit for on-site inspection.

24. A violation of any terms or condition of this permit or any violation of State law not covered by this permit may result in revocation of the permit and other penalties as provided by law. In addition, the Division may consider any such violation as grounds for denying any future permit applications.
25. The issuance of a permit shall not constitute a vested right to receive additional or future permits. There is no right to a renewal or re-issuance of a permit.
26. The Board may immediately amend, suspend, or revoke a permit granted pursuant to these guidelines, in whole or in part, temporarily or indefinitely, if the permit holder(s) has acted in violation of the terms of the permit, or for any good cause shown. Formal notice of such action shall be subsequently communicated in writing to the permit holder and shall set forth the reason for the action taken. Any verbal notification from a Board representative of a violation will also result in immediate cessation of all activities within the Refuge.
27. All possible care will be taken to minimize incidental damage to corals, particularly rare or uncommon species, during the processes of monitoring and removing non-lethal biopsies of individuals.
28. All sampling gear will be disinfected between sites with 10% bleach solution in order to kill any microorganisms and eliminate the possibility of disease transmission by researchers.
29. No live organisms of any kind will be transported within, or outside of, the NWHI State Refuge waters. Samples will be killed by freezing, immersion in ethanol, or other acceptable means.
30. Long term monitoring of sites shall include the documentation of the recovery of biopsied individuals from non-lethal sampling, and shall record any sampling-induced disease, morbidity, or mortality. The results of such monitoring shall be included in the required project report (see item 21, above).

Attachment 2

**LIST OF OTHER PERSONNEL COVERED UNDER THIS PERMIT**

<u>Name</u>	<u>Affiliation</u>
Jill Zamzow, Ph. D.	Hawaii Division of Aquatic Resources
Thierry Work, DVM	USGS
Dave Albert	HIMB

State of Hawaii  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
Division of Aquatic Resources  
Honolulu, Hawaii 96813

April 28, 2006

Board of Land  
and Natural Resources  
Honolulu, Hawaii

THE DIVISION OF AQUATIC RESOURCES REQUESTS BOARD OF LAND AND  
NATURAL RESOURCES (BLNR) AUTHORIZATION/APPROVAL TO ISSUE TWO  
(2) NORTHWESTERN HAWAIIAN ISLANDS (NWHI) RESEARCH, MONITORING  
AND EDUCATION PERMITS TO: 1) DR GRETA AEBY, AND 2) DR. STEPHEN  
KARL, BOTH OF THE HAWAII INSTITUTE OF MARINE BIOLOGY, FOR THE  
NON-LETHAL SAMPLING OF CORALS FOR INVESTIGATIONS OF CORAL  
DISEASE AND BLEACHING SUSCEPTIBILITY

Submitted herewith for your authorization and approval is a request for issuance of two (2) NWHI Research, Monitoring and Education permits to Drs. Greta Aeby and Stephen Karl, both of the Hawaii Institute of Marine Biology, University of Hawaii. These permits, described below, will allow activity to occur in the NWHI State marine Refuge (0-3 miles) waters surrounding French Frigate Shoals. The activities covered under this permit will occur from May 18 to June 11, 2006, from the support vessel Hi'ialakai. Ship details are provided with Item F-4.

The proposed activities (below) are consistent with and support the purposes of the Refuge, primarily to better understand and manage the resources within the marine refuge. Understanding the causes of coral disease and developing biological indicators for disease and bleaching are of value to State resource managers. Such information will allow managers to identify specific coral populations that are particularly fragile, or at risk for disease outbreaks or bleaching, and propose appropriate management strategies.

1. RESEARCH, MONITORING AND EDUCATION PERMIT TO AEBY:

Incidences of coral diseases and bleaching have increased dramatically since the 1980's. The Northwestern Hawaiian Islands are considered to be relatively healthy, but they are not immune to the conditions that have led to the decline of other reef systems. In September 2002 the first mass-bleaching event was recorded in the NWHI, and ten coral disease states have now been described from the NWHI. A 2003 outbreak of white syndrome on *Acropora cytherea* at French Frigate Shoals is of particular concern. Aeby is monitoring this population via established permanent transects, and would like to establish 2-4 additional monitoring sites in areas of high *Acropora* cover. This involves the placement of steel pins into dead substrate, tagging of bleached and diseased corals, and photographic documentation. Furthermore, with collaborators, Aeby would like to investigate fish diseases. High levels of infection with bacteria and protozoa have been seen in ta'ape, and a pigmentation disease of kole has been found in the NWHI.

ITEM F-9

EXHIBIT 3

Knowledge of the location and degree of disease outbreaks is important information for resource managers to utilize in decision-making.

## 2. RESEARCH, MONITORING AND EDUCATION PERMIT TO KARL:

Karl aims to fully characterize the genetic relatedness among individuals of three species of coral on a reef. This information allows him to understand individual variation in disease and bleaching susceptibility. By knowing the genotypes of all individuals on a reef and their current and future disease & bleaching rates, he can provide managers with a predictive tool for monitoring health and differentiating between sensitive and robust sites when making refuge management decisions. Karl will photograph and map the location of all individuals of *Porites lobata* and *Montipora capitata* on a patch reef at FFS, and *Acropora cytherea* at a known disease outbreak location at FFS. He will record the information in a GIS database. He will then take small (2cm<sup>2</sup>) biopsies, and analyze these at the Hawaii Institute of Marine Biology with microsatellite technologies.

### REVIEW PROCESS:

The permits were received by the Division of Aquatic Resources on 1) March 10, 2006 and 2) March 7, 2006. They were sent out for review and comment to the following scientific entities: Division of Aquatic Resources staff (5), Division of Forestry and Wildlife, Northwest Hawaiian Islands Reserve, and the United States Fish and Wildlife Service. Native Hawaiians from the Office of Hawaiian Affairs and Kaho‘olawe Island Reserve Commission were also consulted.

Comments received from the Scientific Community (DAR) on Aeby’s Permit are summarized as follows:

- 1) Concern was expressed that some of the species to be sampled are branching forms and provide essential fish habitat
- 2) Concern was expressed regarding damage caused by transect pin placement, and whether 6 pins were required
- 3) There was concern that appropriate sampling and diving gear protocols should be developed and enforced so as not to spread any coral disease among sites in the NWHI
- 4) Concern was expressed about open-ended sampling language (e.g., “targeted species include...” in the original proposal
- 5) It was questioned whether Aeby could share fish with Bowen (see Item F-6)

Comments received from the Scientific Community (DAR) on Karl’s Permit are summarized as follows:

- 1) Concern was expressed over the large number of samples to be taken



- 2) There was concern that appropriate sampling and diving gear protocols should be developed and enforced so as not to spread any coral disease among sites in the NWHI
- 3) It was asked whether Karl's sampling could take place on or near one of Aeby's transects, so as to minimize overall impact at FFS

Comments received from a Native Hawaiian on both the Research, Education and Monitoring Permits are summarized as follows:

- 1) There was concern for native Hawaiian intellectual property rights for new discoveries and the protection of the resources for their potential product developments.

RESPONSE:

A meeting of DAR staff and HIMB researchers was held on 12 April 2006 to address concerns, and a synopsis of the response to concerns raised is as follows:

Aeby:

- 1) Utmost care will be taken in sampling branching forms, so as not to damage essential fish habitat.
- 2) Protocols are already in place for disinfection of sampling and diving gear between sites in the NWHI. All gear is soaked in 10% bleach solution to kill any microorganisms. All samples will be killed by freezing aboard ship.
- 3) Pins are always placed in dead substrate, not live coral, and utmost care will be taken so as not to damage live coral. Furthermore, it was agreed that the placement of 6 pins in order to assure re-finding the site for future monitoring efforts was preferable to placing fewer pins and possibly not being able to relocate the site.
- 4) Fish sampling will be limited to the species specified in the permit application, and a maximum of 20 fish of any particular species will be taken. Fish will be shared with Bowen.
- 5) The Guidelines for Submitting Permit Applications stipulates that, for all permits, the activity must be non-commercial and will not involve the sale of any organism, byproduct, or material collected. Furthermore, the Guidelines state that resources and samples are a public trust, and are not to be used for sale, patent, bioassay, or bio-prospecting, or for obtaining patents or intellectual property rights. This condition will be added to the Permit Terms and Conditions for this, and all future permits. This should address the concerns raised by the Native Hawaiian reviewer.

Karl:

- 1) Karl pointed out that his small samples are similar to naturally occurring events such as parrotfish feeding. He has chosen species that are abundant across the archipelago, so his impact on a single patch reef at a single site (FFS) is minimal when one looks at the scale of the reef systems in the NWHI.
- 2) Karl and Aeby agreed that Karl could sample at one of Aeby's sites, to minimize overall impact at FFS
- 3) Protocols are already in place for disinfection of sampling and diving gear between sites in the NWHI. Gates' samples are killed by freezing aboard the ship. All gear is soaked in 10% bleach solution between sites to kill any microorganisms and eliminate the possibility of disease transmission. All samples will be killed by freezing aboard ship.
- 4) The Guidelines for Submitting Permit Applications stipulates that, for all permits, the activity must be non-commercial and will not involve the sale of any organism, byproduct, or material collected. Furthermore, the Guidelines state that resources and samples are a public trust, and are not to be used for sale, patent, bioassay, or bio-prospecting, or for obtaining patents or intellectual property rights. This condition will be added to the Permit Terms and Conditions for this, and all future permits. This should address the concerns raised by the Native Hawaiian reviewer.

AMENDMENTS REQUESTED SUBSEQUENT TO APPLICATION SUBMISSION:

Aeby requested via email on April 18, 2006 that Nihoa and Gardner be added to her sampling sites, so that she may sample in the event that coral disease is detected, and that Dr. Jill Zamzow be added to her permit as a sub-permittee.

FINAL STAFF RECOMMENDATIONS:

- 1) Allow Aeby and Karl to take non-lethal samples of corals, not to exceed the numbers specified in the HIMB Coral Sampling Table (attached). Coral samples are to be taken in coordination with other HIMB personnel: the stated sample sizes and numbers are to be shared by Toonen, Aeby, Karl, Rappé and Gates (see separate permit applications).
- 2) Allow the placement of 6 steel pins each for the establishment of 2-4 additional *Acropora* transects at FFS, as outlined in the permit application. Allow coral tagging and photography of these transects.
- 3) Allow mapping and photography of corals as specified in Karl's permit.
- 4) Allow the take of fishes, up to 20 of each species specified in Aeby's permit.

- 5) Allow the addition of sites and personnel to Aeby's permit.

RECOMMENDATION:

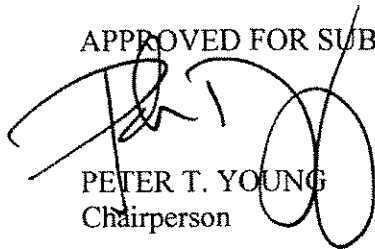
"That the Board authorize and approve, with stated conditions, 1) a Research, Monitoring and Education Permit to Dr. Greta Aeby of the Hawaii Institute of Marine Biology, and 2) a Research, Monitoring and Education Permit to Dr. Stephen Karl of the Hawaii Institute of Marine Biology, for activities and access within the State waters of the NWHI."

Respectfully submitted,



DAN POLHEMUS  
Administrator

APPROVED FOR SUBMITTAL



PETER T. YOUNG  
Chairperson

## APPENDIX 1

**State of Hawai'i  
DLNR  
Northwestern Hawaiian Islands State Marine  
Refuge  
Permit Application Form**

For Office Use Only
Permit No:
Expiration date:
Date Appl. Received: 3/10/06
Appl. Fee received: N/A
NWHI Permit Review Committee date:
Board Hearing date:
Post to web date:

### Type of Permit

- ☒ I am applying for a **Research, Monitoring & Education** permit. (Complete and mail Application)
- ☐ This application is for a NEW project in the State Marine Refuge.
- ☒ This application is for an ANNUAL RENEWAL of a previously permitted project in the State Marine Refuge.
- ☐ I am applying for a permit for a **Native Hawaiian** permit. (Complete and mail Application)
- ☐ This application is for a NEW project in the State Marine Refuge.
- ☐ This application is for an ANNUAL RENEWAL of a previously permitted project in the State Marine Refuge.
- ☐ I am applying for a **Special Activity** permit. (Complete and mail Application)
- ☐ This application is for a NEW project in the State Marine Refuge.
- ☐ This application is for an ANNUAL RENEWAL of a previously permitted project in the State Marine Refuge.

Briefly describe **Special permit** activity:

When will the NWHI activity take place?

- ☒ **Summer** (May-July of 2006 (year)  
Note: Permit request must be received before February 1st  
Specific dates of expedition 5/23 - 6/16/06
- ☐ **Fall** (August-November) of \_\_\_\_ (year)  
Note: Permit request must be received before May 1<sup>st</sup>  
Specific dates of expedition \_\_\_\_\_
- ☐ **Other**

**NOTE: INCOMPLETE APPLICATIONS WILL NOT BE ACCEPTED**

**Please Send Permit Applications to:**

NWHI State Marine Refuge Permit Coordinator  
State of Hawai'i  
Department of Land and Natural Resources  
Division of Aquatic Resources  
1151 Punchbowl Street, Room 330  
Honolulu, Hawai'i 96813

**NWHI State Marine Refuge Permit Application**  
**See Appendix 2 for Application Instructions**

Section A – Applicant Information	
1. Project Leader (attach Project Leader's CV or resume) <input checked="" type="checkbox"/> CV attached <p style="text-align: center;">Aeby, Greta</p>	Title <i>Asst. Researcher</i>
Name: Last, First, Middle Initial	Telephone <i>(808) 236-7400</i>
2. Mailing Address (Street/PO Box, City, State, Zip) <p style="text-align: center;">PO Box 1346  Honohe, HI 96744</p>	Fax <i>(808) 236-7443</i> Email Address <i>Greta@hawaii.edu</i>
3. Affiliation (Institution/Agency/Organization) <p style="text-align: center;">HIMB</p>	For graduate students, Major Professor's Name & Telephone
4. Sub-Permittee/Assistant Names, Affiliations, and Contact Information <input type="checkbox"/> CV or resume attached	
5. Project Title <p style="text-align: center;"><i>Investigate - of fish &amp; coral disease in the NWHI</i></p>	
6. Applicant Signature <p style="text-align: center;"><i>[Signature]</i></p>	7. Date (mm/dd/yyyy) <p style="text-align: center;"><i>3/9/06</i></p>

Section B: Project Information
<p>8. (a) Project Location</p> <p><input checked="" type="checkbox"/> NWHI State Marine Refuge (0-3 miles) waters surrounding:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Nihoa Island</li> <li><input type="checkbox"/> Necker Island (Mokumanamana)</li> <li><input checked="" type="checkbox"/> French Frigate Shoals</li> <li><input type="checkbox"/> Laysan</li> <li><input type="checkbox"/> Maro</li> <li><input type="checkbox"/> Gardner Pinnacles</li> <li><input type="checkbox"/> Lisianski Island, Neva Shoal</li> <li><input type="checkbox"/> Pearl and Hermes Atoll</li> <li><input type="checkbox"/> Kure Atoll, State Wildlife Refuge</li> <li><input type="checkbox"/> Other NWHI location</li> </ul> <p>Describe project location (include names, GPS coordinates, habitats, depths and attach maps, etc. as appropriate).</p>

☒ Enter the NWHI Marine Refuge waters

- (c) Collection of specimens – collecting activities (would apply to any activity):

Common name	Scientific name	No. & size of specimens	Collection Location(s)
-------------	-----------------	-------------------------	------------------------

(d) What will be done with the specimens after the project has ended?

(e) Will the organisms be kept alive after collection? ☐ yes ☒ no

- Specific site/location \_\_\_\_\_
- Is it an open or closed system? ☐ open ☐ closed
- Is there an outfall? ☐ yes ☐ no
- Will these organisms be housed with other organisms? If so, what are the other organisms?

## NWHI State Marine Refuge Permit Application

### Section A - Applicant Information

1. Project leader: Dr. Greta Aeby  
Assistant researcher

2. PO Box 1346  
Kaneohe, HI 96744  
Phone: 808-236-7437  
FAX: 808-236-7443  
Email: [greta@hawaii.edu](mailto:greta@hawaii.edu)

3. Hawaii Institute of Marine Biology

4. Assistants: Dr. Thierry Work, USGS, [Thierry\\_work@usgs.gov](mailto:Thierry_work@usgs.gov). Up to three other assistants will be named at a later date.

5. Project title: Investigation of fish and coral disease in the NWHI

### Section B – Project Information

8a. Project location: Surveys will be conducted at 5 permanent monitoring sites established in 2005 at FFS (Table 1). If time allows, we would like to set up an additional 2-4 sites in areas of high *Acropora* cover.

**Table 1. Permanent sites for disease monitoring set up in 2005**

Island	Site	Type	Depth (ft)	Lat	Long
FFS	tc12	lagoon	37	23 38.278	166 10.779
	tc21	forereef	37	23 50.812	166 19.629
	tc30	lagoon	18	23 50.982	166 17.827
	r11	lagoon	80	23 38.149	166 11.138
	r16	shelf	30	23 51.011	166 19.746

### 8c. Collection of specimens

For coral reproduction studies would like to sample 8 colonies of *Acropora cytherea* with each disease (16 colonies total) as well as 8 control colonies. Two small (3-5cm) samples will be taken per diseased colony and one sample per control colony. Total at FFS =24 samples. For microbiological culture of *Acropora* white syndrome we would like to take one sample (3-5 cm) per infected colony with a maximum of 10 colonies sampled. Total = 10 samples. Samples from other diseased corals will be collected as encountered. . For fish disease studies, targeted species include taape (*Lutjanus kasmira*), the yellowfin goatfish (*Mulloidichthys vanicolensis*), the yellowstripe goatfish (*M. flavolineatus*),

manybar goatfish (*Parupeneus multifasciatus*), sidespot goatfish (*P. pleurostigma*), Pfluger's goatfish (*M. pflugeri*) and kole (*Ctenochaetus strigosus*). A maximum of 20 fish per species would be collected.

8d. Samples will be used for histology, reproductive studies, microbiology and molecular studies which will use up all samples.

## 9. Purpose of activity

### Background

Global climate change and human activities are placing coral reef ecosystems at risk. Coral reefs worldwide are now declining at an alarming rate. Mass bleaching events have increased dramatically since the 1980's and have usually been linked to El Nino or global warming-related increases in annual sea surface temperature (Brown 1997, Barber et al. 2001). The El Nino Southern Oscillation (ENSO) conditions during 1997 to 1998 resulted in worldwide bleaching from the Western Atlantic to the Great Barrier Reef. ENSO events have increased in frequency and duration in the past two decades (Barber et al. 2001, Walker 2001) and it has been predicted that the frequency and severity of coral bleaching will also continue to rise (Hoegh-Guldberg 1999).

The incidence of coral diseases has also greatly increased (Santavy and Peters 1997, Green and Bruckner 2000). In the Florida Keys, Porter et al. (2001) report that between 1996 and 1998 the number of survey stations containing diseased individuals increased by 265%. They also report dramatic increases in the number of different coral species exhibiting disease. Coral disease has also been reported to be responsible for the dramatic decline of Acroporids, one of the major frame-building corals in the Florida Keys, changing the structure and function of the coral reef ecosystem (Aronson & Precht 2001). Despite the major impact disease can have on reef systems, the etiology of most coral diseases remains unclear (Santavy and Peters 1997, Richardson 1998). The causative agents, mechanism of pathogenesis and link to environmental or anthropogenic stress are still largely unknown (Richardson 1998, Green & Bruckner 2000).

The reefs of the Northwestern Hawaiian Islands (NWHI) are considered to be relatively healthy but they are not immune to the conditions that have led to the decline of other reef systems. In September 2002 the first mass-bleaching event was recorded on the reefs of the NWHI. In the three northwestern most atolls of the Archipelago (Pearl & Hermes, Midway and Kure) over half of all sites had significant bleaching (Aeby et al. 2003, Kenyon et al., in press). Ten coral disease states have now been described from the NWHI (Aeby in press<sub>a</sub>). An outbreak of white syndrome on *Acropora cytherea* was found at French Frigate Shoals (FFS) in 2003 and appears to be spreading throughout FFS (Aeby, 2006). *Acropora* white syndrome has resulted in significant reduction of acroporid corals in some areas of the Marshall Islands (Jacobson 2006). It is important for management agencies to have a thorough understanding of the vulnerability of these reefs to the different threats in order to develop appropriate management plans for their conservation.

We are proposing to re-survey permanent sites established at FFS in 2005 and if time permits establish 2-4 additional sites in areas of high *Acropora* cover. *Acropora* white syndrome was discovered at FFS in 2003 (Aeby 2006) and is a disease of concern



in the NWHI. Establishment of permanent sites will allow us to determine both temporal and spatial changes in diseases through time and to determine the ultimate affect of disease on the health of the ecosystem. We will measure changes in disease levels through time, rates of tissue loss from different diseases, patterns of disease transmission among colonies, rate of spread of disease and evaluate changes in coral cover and coral species composition. This information can only be acquired through re-surveying the same transects on a reef and thus requires placement of permanent markers. From these surveys we will also be able to collect small samples of diseased and healthy coral for follow up laboratory investigations. The laboratory investigations will allow us to develop the tools necessary to elucidate the etiology, pathophysiology, and epizootiology of disease in the major groups of scleractinian corals in Hawaii. We will have an onboard microbiology lab allowing a through investigation of the microbiota of encountered coral diseases.

Disease can affect coral communities directly through mortality of colonies (partial or whole) resulting in reduced coral cover or indirectly through sub-lethal events such as reduced growth, resilience or reproduction. *Acropora cytherea* at FFS is affected by two diseases (*Acropora* white syndrome and *Acropora* growth anomalies) which are of concern to managers. Permanent sites have been set up at FFS to understand the progression of these two coral diseases and we would now like to examine the affect of these two diseases on the reproductive output of *Acropora cytherea*. *A. cytherea* is know to reproduce during May/June in the NWHI (Kenyon 1992) and so the timing of this cruise will allow us to compare the reproductive output of infected versus uninfected colonies.

Diseases in marine ecosystems are not only limited to corals. Fibropapillomatosis of green turtles has been known in Hawaii since the 1950s (Balaz 1991). More recently, high levels of infections with bacteria and protozoa have been seen in taape (*Lutjanus kasmira*) (Work et al. 2003). Taape were introduced into Hawaii in the 1950s (Randall 1987) and have spread all the way to Midway Atoll. Taape are closely associated with certain native fish such as goatfish (*Mulloidichthys* sp.) (Friedlander et al. 2002) and goatfish from the main Hawaiian Islands have been found to be infected with some of the same diseases as taape (Work et al. unpub. data). We would like to examine whether these diseases have spread up into the NWHI. In addition, in May 2005 a pigmentation disease of kole (*Ctenochaetus strigosus*) was found in the NWHI. These fish have obvious altered skin pigmentation and a reduced body condition. We would like to do further studies on any infected fish encountered.

#### Objectives:

- 1) To re-survey permanent sites established in 2005 for the assessment of disease dynamics.
- 2) To establish 2-4 more permanent sites in areas of high *Acropora* cover.
- 3) Culture microbiota associated with *Acropora* white syndrome.
- 4) Examine the reproductive cost of *Acropora* white syndrome and growth anomalies.
- 5) Examine taape and native goatfishes from NWHI for presence of disease.
- 6) Examine any kole (*Ctenochaetus strigosa*) affected by pigmentation disease.

**Justification:**

Recently, outbreaks of novel diseases have occurred in the world's oceans. Mass mortality of sea fans occurred in reefs of the Caribbean and Florida Keys. The pathogen, *Aspergillus*, was thought to be a new species that originated from terrestrial sources (Smith et al., 1996, Rosenberg and Ben-Haim 2002). White pox, a lethal disease of *Acropora palmata*, was first documented on the reefs in 1996 and was found to be caused by a common fecal enterobacterium found in the human gut (Patterson et al. 2002). Current models of global climate change predict a significant increase in sea surface temperature (Kleypas et al. 1999, Walker 2001). Elevated temperatures have been shown to accelerate the growth rate and pathogenicity of pathogens (Porter et al., 2001) and so it has been predicted that coral disease will become even more common and widespread (Porter et al. 2001, Rosenberg and Ben-Haim 2002). Disease in the Indo-Pacific is on the rise (Willis et al. 2005, Jacobson 2006) and so it is important we gain a better understanding of the disease dynamics on the reefs of the NWHI. This knowledge will be critical if we are to effectively address coral disease outbreaks and provide appropriate management recommendations to resource biologists. This study will focus on *Acropora* which does not occur in the main Hawaiian Islands.

**10. Procedure:****Techniques:**

**Surveys:** Re-survey of established sites will follow established protocol. Two 25 m lines will be laid out. A diver will then swim over the lines during which all corals within one half meter of either side of the transect lines will be identified to specie, counted, and assigned to a size class (0-5cm; 6-10cm; 11-20cm; 21-40cm; 41-80cm; 81-150cm; >150cm.). In the same manner, a second diver will swim over the lines and examine all corals for signs of bleaching or disease. Bleached colonies will be assigned a bleaching category: 0-no bleaching; 1- 10-30%; 2-30-50%; 3-50-100%; 4- 100%; 5-mortality. For corals exhibiting disease, a general description of the condition will be recorded, the coral will be photographed and a specimen will be collected for histopathological and molecular examination. All enumerated bleached and diseased corals will also be assigned a size class consistent with the population counts. Individual colonies tagged in 2005 will be relocated, remarked and photographed. Any new infected colonies found along the transect will be photographed and tagged.

To establish new permanent sites, two 25-meter lines will be marked with steel pins at 5-meter intervals. GPS units will be recorded at the start of each transect. This method has been used successfully by USFWS personnel at sites within the NWHI. Both transect lines will be surveyed for coral disease and diseased colonies encountered along the belt transect will be marked and their position recorded.

**Coral reproduction:** Small samples from infected and non-infected *Acropora cytherea* will be collected, preserved in 10% formalin and decalcified. For each sample piece, 5 fertile polyps from a 1 cm length of tissue behind the sterile growing tip will be randomly chosen for dissection. Maximum and median diameter of each oocyte will be measured and oocyte size computed as a geometric mean. The length of each individual testis in each polyp will also be recorded. Histological sections of polyps, prepared by standard techniques will be examined to determine maturity of gonads.

**Bacterial Isolation:** Water samples and mucus from diseased corals will be plated onto marine agar (MA) and a *Vibrio* selective media (TCBS; thiosulfate citrate bile salt sucrose) (Difco-BBL, Franklin Lakes NJ) for grow out of culturable bacteria. In brief, fifty  $\mu$ L of sample will be inoculated onto each media culture plate and spread using a heat-sterilized glass spreader. Cultures will be incubated at room temperature until colonies are visible (1-3 days on average) Bacterial colonies will be collected from the MA and TCBS plates using a variety of selection criteria (colony elevation, color, shape, margin, motility, and surface texture). All unique colonies will be archived as glycerol stocks and frozen at -80°C.

**Fish:** Fish will be weighed and measured (standard and fork length), examined systematically externally and internally, and gross lesions documented. For histopathology, sections of skeletal muscle, skin, spleen, liver, cranial and caudal kidneys, swim bladder, brain, heart, gill, and gonad, small intestines, and stomach will be excised and fixed in 10% neutral buffered formalin. Tissues will sectioned, dehydrated in alcohol series, embedded in paraffin, sectioned at 5  $\mu$ m, placed on microscope slides, stained with hematoxylin and eosin, and examined using a light microscope. Special stains will be used as appropriate to identify fungi, bacteria, or protozoa. Histopathology will allow us to characterize microscopic morphology of disease, will provide systematic evaluation of cellular changes that occur in disease, and will afford the opportunity to detect microorganisms and the host response to these organisms. Targeted fish species include taape (*Lutjanus kasmira*), kole (*Ctenochaetus strigosus*), the yellowfin goatfish (*Mulloidichthys vanicolensis*), the yellowstripe goatfish (*M. flavolineatus*), manybar goatfish (*Parupeneus multifasciatus*), sidespot goatfish (*P. pleurostigma*), and Pfluger's goatfish (*M. pflugeri*). A maximum of 20 fish per species would be collected.

**11. Funding source.** The project will be funded by the NWHICRER-HIMB partnership NMSPO MOU 2005-008/66882.

## 12. Literature cited

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- Work T, Rameyer RA, Takata G, Kent M. 2003. Protozoal and epitheliocystis-like infections in the introduced blueline snapper *Lutjanus kasmira* in Hawaii. *Diseases of Aquatic Organisms* 37:59-66.

### 13. What types of insurance do you have in place?

NOAA Ship HI'IALAKAI is a U.S. Government-owned and -operated research vessel and is self-insured by the U.S. Government.

**14. What certifications/inspections do you have scheduled for your vessel?**

- Rat Free (scheduled with U.S. Dept. of Health and Human Services for April 2006)
- Hull Inspection (scheduled with Hawaii Institute of Marine Biology biologists (normally Scott Godwin) prior to projects working in the Northwestern Hawaiian Islands (NWHI)) to ensure no nuisance algae or other fouling species are transported to the NWHI.
- Ballast water information is transmitted to USCG as required by CFR Title 33, Vol. 2, Parts 151.1500 to 199; IMO Resolution A.868(20); and USCG COMDTPUB P16700.4

**15. Permits:** The proposed research is subject to the jurisdiction of the U.S. Fish & Wildlife Service and its Special Use Permit requirements, NWHI Coral Reef Ecosystem Reserve and to State of Hawaii jurisdiction and approvals. Applications to the State of Hawaii, FWS and the NWHI CRER have been submitted.

**16.** This research will be conducted in collaboration with ongoing annual disease monitoring conducted during NWHI RAMPs. All permanent sites established will be reported to the US FWS coral biologist for possible inclusion into their monitoring program.

**Section C. Logistics**

**17.** The cruise is scheduled for May 23-June 16. Dates within the NWHI State marine refuge are scheduled for May 24-June 3, 2006. Hiialakai is scheduled to be in the NWHI at the following places and dates contingent upon weather. Hono-Nihoa 5/23-24; Nihoa; 5/25-27; FFS 5/28-6/1; Gardner 6/2-6/3/06.

**18. Gear and materials**

Dive gear  
Collecting equipment  
Chemicals (formalin, z-fix)

**19. Fixed installations**

Transect markers: steel pins  
Colony markers; cable ties

**20. Time line**

Fall 2006: histology processing, coral reproduction dissections. Spring 2007: data analysis and report writing

## 21. Vessel Information

Vessel Name – NOAA Ship HI'IALAKAI

IMO Number – 8835619

Vessel Owner – U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration (NOAA)

Flag – USA

Captain's Name – CDR Scott Kuester, NOAA

Chief Scientist or Project Leader – Randall Kosaki, Ph.D., NOAA

Vessel Type – Oceanographic Research

Call Sign – WTEY

Length – 224 feet

Gross Tonnage – 1,914

Port of Embarkation – Honolulu

Last port vessel will have been at prior to this embarkation – Pago Pago, Amer. Samoa

Total Ballast Water Capacity:

Volume – 487 m3 (128,834 U.S. gal.)

Total number of ballast tanks on ship – 10

Total Fuel Capacity:

228,642 U.S. gal. at 98% capacity

Total number of fuel tanks on ship – 15

Other fuel/chemicals to be carried on board and amounts: gasoline – as much as 700 U.S. gal.; lube oil – as much as 10,442 U.S. gal.; numerous other industrial and household chemicals used to operate a 224-foot research vessel

Number of tenders/skiffs aboard and specific type of motors:

Ship's own tenders - 1 each 10 m AMBAR Marine jet boat with Yanmar 370-hp, Diesel inboard engine  
1 each 8 m AMBAR Marine jet boat with Yanmar 315-hp, Diesel inboard engine  
2 each 17.5 ft Zodiac inflatable boats, each with one Honda 50-hp, 4-stroke, outboard gasoline engine  
1 each 19 ft AMBAR Marine rescue boat with Honda 115-hp, 4-stroke, outboard gasoline engine

Program-provided tenders – 19' Boston Whaler with 135 hp Honda four-stroke outboard

Does the vessel have the capability to hold sewage and grey-water? Describe in detail. The ship has a 4,000 U.S. gal Collection Holding Tank for sewage and grey water. In those waters where effluent may NOT be discharged, sewage and grey water are held in this tank until the ship is in waters where sewage and grey water may be discharged. The ship has a U.S. Coast Guard-approved Marine Sanitation Device (Omnipure model MSD 12 MC) which is used to treat sewage and grey water in those waters where effluent may be discharged.

Does the vessel have a night-time light protocol for use in the NWHI? Describe in detail. Navigation lights are on 24-hours/day. Work lights are put on at night only when conducting CTD operations. Weather decks are not illuminated at night.

On what workboats (tenders) will personnel, gear and materials be transported within the State Marine Refuge? - Personnel, gear and materials may be transported within the State Marine Refuge by the ship or any of the 5 ship's small boats listed above or by the program-provided small boat listed above.

How will personnel, gear and materials be transported between ship and shore? - Personnel, gear and materials may be transported between ship and shore by any of the 5 ship's small boats listed above or by the program-provided small boat listed above.

If applicable, how will personnel be transported between islands within any one atoll? - Personnel may be transported between islands within any one atoll by any of the 5 ship's small boats listed above or by the program-provided small boat listed above.

HIMB Coral Sampling Table

Coral species	Site	number	size
Acropora cytherea	FFS	50	6 cm square
Acropora cytherea	FFS	450	2 cm square
Acropora cytherea	Nihoa	50	6 cm square
Acropora cytherea	Gardner	50	6 cm square
Acropora nasuta	FFS	5	2 cm square
Acropora nasuta	Nihoa	5	2 cm square
Acropora nasuta	Gardner	5	2 cm square
Acropora paniculata	FFS	5	2 cm square
Acropora paniculata	Nihoa	5	2 cm square
Acropora paniculata	Gardner	5	2 cm square
Pocillopora damicornis	FFS	5	2 cm square
Pocillopora damicornis	Nihoa	5	2 cm square
Pocillopora damicornis	Gardner	5	2 cm square
Pocillopora meandrina	FFS	50	6 cm square
Pocillopora meandrina	Nihoa	50	6 cm square
Pocillopora meandrina	Gardner	50	6 cm square
Pocillopora eydouxi	FFS	5	2 cm square
Pocillopora eydouxi	Nihoa	5	2 cm square
Pocillopora eydouxi	Gardner	5	2 cm square
Porites lobata	FFS	450	2 cm square
Porites lobata	FFS	50	6 cm square
Porites lobata	Nihoa	50	6 cm square
Porites lobata	Gardner	50	6 cm square
Porites brighami	FFS	5	2 cm square
Porites brighami	Nihoa	5	2 cm square
Porites brighami	Gardner	5	2 cm square
Porites lichen	FFS	5	2 cm square
Porites lichen	Nihoa	5	2 cm square
Porites lichen	Gardner	5	2 cm square
Montipora capitata	FFS	450	2 cm square
Montipora capitata	FFS	50	6 cm square
Montipora capitata	Nihoa	50	6 cm square
Montipora capitata	Gardner	50	6 cm square
Montipora patula	FFS	5	2 cm square
Montipora patula	Nihoa	5	2 cm square
Montipora patula	Gardner	5	2 cm square
Leptastrea bewickensis	FFS	5	2 cm square
Leptastrea bewickensis	Nihoa	5	2 cm square
Leptastrea bewickensis	Gardner	5	2 cm square
Pavona varians	FFS	50	6 cm square
Pavona varians	Nihoa	50	6 cm square
Pavona varians	Gardner	50	6 cm square
Fungia scutaria	FFS	50	6 cm square
Fungia scutaria	Nihoa	50	6 cm square
Fungia scutaria	Gardner	50	6 cm square
Tubastraea coccinea	FFS	50	2 cm square
Tubastraea coccinea	Nihoa	50	2 cm square
Tubastraea coccinea	Gardner	50	2 cm square

\* if diseased corals are encountered for any species: If sample size is less than 30, sample size will be increased to 30 (10 each site) and if chip size is 2 cm<sup>2</sup>, chip size will be increased to 6 cm<sup>2</sup>.

Coral collectors will be working in close coordination with one another. One team will be collecting larger (6 cm) samples, the other team will collect small (2 cm) samples. They will communicate to ensure that oversampling does not occur.



## Greta Smith Aeby

### EDUCATION

- 2000-2002    **Post-doctoral research associate**, University of West Florida  
Field of study: coral bleaching and disease
- 1998        **Ph.D., University of Hawaii at Manoa**  
Field of study: Coral biology, coral reef ecology, evolution and ecology of a marine trematode parasite of corals and reef fish.
- 1981        **B.S., University of New Mexico**  
Major: Biology    Minor: Chemistry

### EMPLOYMENT

#### Research:

- 9/05-        Assistant researcher, Hawaii Institute of Marine Biology.  
Research on the epizootiology of coral disease.
- 9/02- 9/05    NWHI Research Coordinator, Hawaii Dept. of Land and Nat. Resources  
Assessment of the frequency of coral bleaching and disease on reefs in the Northwestern Hawaiian Islands. Designing a management plan for and coordinating research projects occurring in the NWHI.
- 7/00-8/02    Post-doctoral research associate, University of West Florida  
Factors affecting the susceptibility of corals to bleaching. The role of reef fish in the susceptibility and spread of black band disease of corals.
- 1/98-6/00    Researcher, Hawaii Cooperative Fishery Research Unit  
Fisheries ecology of deep-water bottomfish. Trophic interactions between introduced blueline snapper and native deep-water snappers. Pisces V submersible deep-water habitat surveys.
- 1990-1992    Research Assistant, Hawaii Institute of Marine Biology  
Population biology of selected mobile finfish species within Kaneohe Bay.
- 1995-1997    Research Assistant, Hawaii Institute of Marine Biology  
Research assistant. Coordinated SCUBA diving at HIMB including maintenance of compressors and tanks.

### PUBLICATIONS

- Aeby, G.S. 2006. Outbreak of coral disease in the Northwestern Hawaiian Islands. *Coral Reefs* 24(3):481.
- Aeby, G.S. In press. Baseline levels of coral disease in the Northwestern Hawaiian Islands. *Proc. 3<sup>rd</sup>. Symp. Northwestern Hawaiian Islands*.
- Kenyon, J. G. Aeby, R. Brainard, J. Chojnacki, M. Dunlap, C. Wilkinson. In press. Mass coral bleaching on high-latitude reefs in the Hawaiian Archipelago. *Proc. 10<sup>th</sup> Int. Coral Reef Symp.*
- Aeby, G.S. and Santavy, D.L. In press. Factors affecting the susceptibility of the coral *Montastrea faveolata* to black-band disease. *Mar Ecol Prog Ser*
- Kenyon, J., Vroom, P., Page, K., Dunlap, M., Wilkinson, C. and G. Aeby. 2006. Community Structure of Hermatypic Corals at French Frigate Shoals, Northwestern Hawaiian Islands: Capacity for Resistance and Resilience to Selective Stressors. *Pac Sci* 60(2):153-175.

- Work, T. and G. Aeby. In press. Systematically describing gross lesions in corals. Dis Aquatic Org
- Maragos, J., G. Aeby, D. Gulko, J. Kenyon, D. Potts, D. Siciliano, and D. VanRavensway. 2004. The 2000-2002 Rapid Ecological Assessment of Corals in the Northwestern Hawaiian Islands, Part I: Species and Distribution. Pacific Science 58(2):211-230.
- Aeby, G. 2003. Corals in the genus *Porites* are susceptible to infection by a larval trematode. Coral Reefs 22:216.
- Aeby, G.S., Kenyon, J., Maragos, J. and Potts, D. 2003. First record of mass coral bleaching in the Northwestern Hawaiian Islands. Coral Reefs 22:256.
- Aeby, G.S. 2002. Trade-offs for the butterflyfish, *Chaetodon multicinctus*, when feeding on coral prey infected with trematode metacercariae. Behav. Ecol. Sociobiol. 52:158-163.
- Aeby, G.S. 1998. A digenean metacercaria from the reef coral, *Porites compressa*, experimentally identified as *Podocotyloides stenometra*. J. Parasitol. 84:1259-1261.
- Clarke, T. and Aeby, G.S. 1998. The use of small mid-water attraction devices for the investigation of the pelagic juveniles of carangid fishes in Kaneohe Bay, HI. Bull. Mar. Sci. 62:947-955.
- Gochfeld, D.J. and Aeby, G.S. 1997. Control of populations of the coral-feeding nudibranch, *Phestilla sibogae*, by fish and crustacean predators. Mar. Bio. 130:63-69.
- Aeby, G.S. 1993. The potential effect the ability of a coral intermediate host to regenerate may have had on the evolution of its association with a marine parasite. Proc. Seventh Intl. Coral Reef Symp. 2:809-815.
- Aeby, G.S. 1991. Behavioral and ecological relationships between a parasite and its hosts. Pacific Science 45:263-269.

## GRANTS

- 2005 *Investigation of coral disease on the reefs of American Samoa*. (G. Aeby, T. Work, D. Fenner). \$13,981. American Samoa Coral Reef Advisory Group.
- 2005 *Chemical mechanisms of disease resistance in Hawaiian corals*. (D. Gochfeld, G. Aeby, J. Miller). \$26,204. Hawaii Coral Reef Initiative.
- 2004 *Coral Disease on the reefs of American Samoa*. (G. Aeby, T. Work, E. Didonato). \$12,800. American Samoa Coral Reef Advisory Group.
- 2004 *Investigation of disease in coral and reef fish on Maui*. (G. Aeby, J. Parrish, T. Lewis, T. Work, S. Coles, J. Casey). \$79,900. Hawaii Coral Reef Initiative.
- 2004 *Anthropogenic organic contaminants on coral reefs: global atmospheric deposition or local sources?* (G. Garrison, G. Aeby, B. Walsh, C. Orazio, J. Carroll). \$49,500. USGS State Partnership Program.
- 2003 *Investigation of disease in introduced and native Hawaiian fish*. (M. Kent, T. Work, G. Aeby, W. Font). \$69,000. Hawaii Coral Reef Initiative.
- 2003 *Investigation of coral disease on the reefs of Oahu*. (T. Lewis, G. Aeby, T. Work, S. Coles). \$79,000. Hawaii Coral Reef Initiative.
- 2003 Edwin W. Pauley 2003 Summer Program – *Pacific Coral Health Workshop and Molecular Biology Techniques* (P. Jokiel, G. Aeby, E. Cox, J. Leong, T. Lewis). \$75,000, funded by the Pauley Foundation.

## **THIERRY MARTIN WORK**

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(808) 247-6989

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PO Box 50167  
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(808) 541-3445

### **EDUCATION**

- 1988-91 • Residency in Wildlife medicine, University of California, Davis (UCD).
- 1990 • Master of Preventive Veterinary Medicine (UCD).
- 1988 • Doctor of Veterinary Medicine (UCD).
- 1986 • Master of Science, Entomology (UCD).
- 1983 • Bachelor of Science *cum laude*, Entomology, Texas A&M University.

### **CURRENT EMPLOYMENT**

Project leader of the Honolulu Field Station (HFS) for the US Geological Survey National Wildlife Health Center (USGS-NWHC) which required developing client contacts, and hiring and managing a technician and volunteers. The HFS, is the primary resource for wildlife health related issues in Hawaii and US territories in the Pacific Basin. The HFS serves or coordinates with a wide variety of public agencies and private organizations. HFS conducts research and field work on diseases of free-ranging terrestrial and marine wildlife.

### **EMPLOYMENT HISTORY**

- 1992- • Wildlife Disease Specialist for USGS-NWHC-HFS.
- 1988-91 • Wildlife Veterinarian, Wildlife Investigations Laboratory, CDFG.

### **LICENSES AND PROFESSIONAL ASSOCIATIONS**

- 1992- • American Association of Zoo Veterinarians
- 1991- • American Association of Wildlife Veterinarians
- 1989- • Wildlife Disease Association
- 1988- • Licensed and accredited veterinarian in California
- American Veterinary Medical Association

### **HONORS**

- 1996 • National Biological Service STAR award
- 1994 • National Biological Survey Quality Performance Award
- 1993 • US Fish and Wildlife Service Special Achievement Award
- 1983 • Phi Kappa Phi; Phi Sigma
- 1981-83 • Distinguished Student (honor roll)
- 2004 • Sigma Xi

**RECENT PEER-REVIEWED PUBLICATIONS**

- Work, T. M.,** G. H. Balazs, R. A. Rameyer, R. M. Morris. 2004. Retrospective pathology survey of green turtles (*Chelonia mydas*) with fibropapillomatosis in the Hawaiian Islands, 1993-2003. *Diseases of Aquatic Organisms* 62:163-176.
- Greenblatt, R. J., S. L. Quackenbush, R. N. Casey, R. Rovnak, G. H. Balazs, **T. M. Work**, J. W. Casey, and C. A. Sutton. 2005. Genomic variation of the fibropapilloma-associated marine turtle herpesvirus across seven geographic areas and three host species. *Journal of Virology* 79:1125-1132.
- Work, T. M.** 2005. Cancer in sea turtles. *Hawaii Medical Journal* 64:23-24.
- Work, T. M.,** G. H. Balazs, J. L. Schumacher and A. Marie. 2005. Epizootiology of spirorchiid infection in green turtles (*Chelonia mydas*) in Hawaii. *Journal of Parasitology*. 91:871-876.
- Work, T. M.** and R. A. Rameyer. 2005. Evaluating coral reef health in American Samoa. *Coral Reefs* 24:384-390.
- Roffe, T. J. and **T. M. Work**. 2005. Wildlife health and disease investigations. *In*. Braun C. E. (ed.) *Techniques for wildlife investigations and management*, 6<sup>th</sup> edition. The Wildlife Society, Bethesda, MD. pp. 616-631.
- Yabsley, M. J., **T. M. Work**, and R. A. Rameyer 2005. Molecular phylogeny of *Babesia poelea* from brown boobies (*Sula leucogaster*) from Johnston Atoll, Central Pacific. *Journal of Parasitology* (in press)
- Greenblatt, R. J., **T. M. Work**, P. Dutton, C. A. Sutton, T. R. Spraker, R. N. Casey, C. E. Diez, D. Parker, J. St. Ledger, G. H. Balazs, and J. W. Casey. 2005. Geographic variation in marine turtle fibropapillomatosis. *Journal of Zoo and Wildlife Medicine* 36:527-530.
- Reynolds, M., **T. M. Work** . 2005 Mortality in the endangered Laysan Teal *Anas laysanensis*: conservation implications. *Wildfowl* 55:31-48.
- Work, T. M.,** and G. S. Aeby. 2006. Systematically describing gross lesions in corals. *Diseases of Aquatic Organisms* (in press)

**LANGUAGES**

French, Spanish [fluent]; Russian, Tok Pisin [working knowledge].

## Hi'ialakai Cruise Timeline

Jill P. Zamzow, Ph.D.  
NWHI Research Coordinator  
State of Hawaii Division of Aquatic Resources

I was aboard Hi'ialakai cruise 06-07 with researchers from the Hawaii Institute of Marine Biology from 18 May to 11 June 2006. The following is documentation of my observations aboard the vessel during that time period. The cruise track was from Honolulu to Nihoa to French Frigate Shoals to Gardner Pinnacles to French Frigate Shoals to Johnston Atoll to Honolulu.

On May 23, 2006, upon arrival at Gardner Pinnacles from French Frigate Shoals (FFS), Chief Scientist Randall Kosaki realized that Dr. Greta Aeby had a living sample of a *Montipora* species coral in a bucket on deck. Due to weather issues, we only worked at Gardner Pinnacles for one day, and the vessel, and the coral, returned to FFS on 5/24/06. I believe that the coral was returned to its native habitat, although it may have been destroyed – Dr. Kosaki would know. I only remember receiving word that it was “taken care of”.

On May 29, 2006 we finished our work at FFS and departed en route for Johnston Atoll. The next day, or shortly thereafter, Chief Scientist Kosaki and I realized that Dr. Aeby's technician was culturing micro-organisms taken from healthy and diseased corals. We were unsure as to whether this was allowed on her permits. Dr. Kosaki and I both made telephone calls to Honolulu looking for advice and clarity on the matter. On May 31, 'Aulani Wilhelm of the NWHI Marine National Monument (then Coral Reef Ecosystem Reserve) emailed Dominique Horvath of U. S. Fish and Wildlife Service stating that Dr. Aeby could not bring anything back from the NWHI alive. Dr. Jo-Ann Leong, Director of the Hawaii Institute of Marine Biology, emailed asking Dr. Aeby to kill the cultured micro-organisms. All of the cultures are frozen before we arrive at Johnston Atoll after sunset on the 31<sup>st</sup>.

We worked at Johnston Atoll from the 1<sup>st</sup> June through the 7<sup>th</sup>. While transiting back to Honolulu on the 9<sup>th</sup> June, we received an email directing that all the frozen micro-organisms be immersed in bleach, to ensure their demise. On the 10<sup>th</sup> June, all the frozen culture plates were bleached in 100% Clorox. We re-entered State waters on the 11<sup>th</sup> June.

Randall Kosaki, Ph.D.  
Research Coordinator  
NOAA NWHI Marine National Monument

**A. Transport of live corals between French Frigate Shoals and Gardner Pinnacles**

NOAA ship HI'IALAKAI cruise HI-06-07 began in Honolulu on 5/18/06. The cruise plan called for stops at Nihoa, French Frigate Shoals, Gardner Pinnacles, and Johnston Atoll.

At approximately 1830 on the evening of 5/23/06, HI'IALAKAI began the 110 nautical mile transit from French Frigate Shoals to Gardner Pinnacles. After arrival at Gardner Pinnacles on the morning of 5/24/06, while preparing dive gear for the day's activities, I noticed two pieces of live *Acropora cytherea* (table coral) tied to "eggcrate" mesh in Dr. Greta Aeby's holding tank. I had not noticed the pieces earlier, as they were in a bucket contained within a larger holding tank, and were not readily visible to a casual observer. The pieces appeared to have been two (broken) pieces of what was once one larger piece, originally 10 cm in greatest dimension. The coral did not exhibit any signs of disease, tumors, or bleaching, and appeared to be in good health. I immediately sought out Aeby. When queried, Aeby told me that the coral was collected alive at French Frigate Shoals and had in fact made the transit to Gardner Pinnacles in an open system (flow through) seawater tank, with the discharge going over the side. Although *Acropora* corals occur naturally at Gardner Pinnacles, I instructed her to close off the seawater system for the duration of our stay at Gardner Pinnacles (and subsequent transit back to French Frigate Shoals), and requested that she return the corals to an area of suitable habitat as soon as possible upon our return to French Frigate Shoals. At this time, I also notified the State DLNR representative on board (Dr. Jill Zamzow, State NWHI Research Coordinator), and informed her that a permit violation may have occurred.

At approximately 1830 on the evening of 5/24/06, HI'IALAKAI began its transit back from Gardner Pinnacles to French Frigate Shoals. On the morning of 5/25/06, Aeby replaced the live *Acropora* on a reef near to its collection site, in an *Acropora* rich habitat. *Acropora* coral has the ability to re-cement itself to the bottom and grow well after natural fragmentation events (due to storms, etc.). Aeby informed me that her coral fragments were replaced on the reef in a manner which would allow for re-attachment and growth. This was verified by her dive buddy, Dr. Thierry Work of USGS.

Factually incorrect statements that were contained a previous document circulated to the Land Board in August 2006. The following events referenced in that document DID NOT occur on this cruise:

1. Disease-bearing corals were not transported anywhere aboard HI'IALAKAI, either within or between atolls.

2. Corals (healthy or diseased) were not transported “all the way up the NWHI... to Midway.” Gardner Pinnacles (as described above) is the farthest to the northwest that . This cruise did not go anywhere near Midway.
3. Corals (healthy or diseased) were not transported to “within a day or so “ of Johnston Atoll. No live corals left the vicinity of French Frigate Shoals and Gardner Pinnacles.

The only transport of live corals on NOAA ship HI'IALAKAI cruise HI-06-07 is that which I have described above.

## **B. Culture of live bacteria aboard NOAA ship HI'IALAKAI**

Dr. Greta Aeby and her technician, Mr. David Albert, brought aboard a temperature-controlled bacterial culture incubator and sterile agar plates at the start of the cruise with the intent of culturing and then preserving potential coral disease pathogens. The incubator was set up and running in the ship's wet lab during the transit from Honolulu to French Frigate Shoals, as well as during operations at French Frigate Shoals. The wet lab is a community lab space with stainless steel sinks at which all specimens are processed, preserved, dissected, etc. While at French Frigate Shoals, Albert placed some test agar plates in the incubator (in the wet lab). The quickly showed themselves to be colonized with a multitude of bacteria, most likely the result of contamination from the incubator's proximity to a variety of humans, specimens, and other sources of contamination. Albert told me the wet lab was a “bacterial cesspool,” not at all suited for the type of research that Aeby hoped to pursue.

The Chief Boatswain aboard HI'IALAKAI, Mark O'Connor, provided Albert with space for the incubator in a forward storage compartment, away from the hustle and bustle of the wet lab, and off-limits to other members of the scientific party (and out of view of myself or Jill Zamzow). Albert apparently found this satisfactory, as his grumblings to me ceased. On or about 5/30/06, I realized that Albert was culturing live bacteria from colonies of diseased coral. Because of a lack of clarity regarding which specific activities were found to be agreeable to HIMB and DLNR (per their pre-cruise meeting), I contacted Honolulu via email and phone (Dr. Jo-Ann Leong, HIMB director; Ms. Aulani Wilhelm, NWHI Coral Reef Ecosystem Reserve acting coordinator) for clarification. Dr. Leong requested that Aeby kill all bacterial cultures by freezing. All agar plates were frozen by Mr. Albert (verified by myself). All plates were frozen on the evening of 5/31/06, the day before our arrival at Johnston Atoll.

On 6/11/06, while transiting from Johnston Atoll to Honolulu, I received email instructions from a DLNR representative (Ms. Athline Clark) to destroy all agar plates in 100% bleach. I watched Albert soak all plates in bleach. The bleached plates were packaged in Biohazard plastic bags, and destroyed at a shoreside facility after our arrival in Honolulu on 6/11/06..

Dan A  
Polhemus/DLNR/StateHiUS  
01/02/2007 04:40 PM

To James B Rogers/DLNR/StateHiUS@StateHiUS  
cc  
bcc  
Subject Fw: Glycerol stocks of bacteria from French Frigate &  
Johnston Atoll

Blaine -

Here is the message from HIMB asking Greta to destroy her samples, dated 31 May 2006.

- Dan Polhemus

----- Forwarded by Dan A Polhemus/DLNR/StateHiUS on 01/02/07 04:39 PM -----



Athline M  
Clark/DLNR/StateHiUS  
05/31/06 04:23 PM

To Dan A Polhemus/DLNR/StateHiUS@StateHiUS, Francis G  
Oishi/DLNR/StateHiUS@StateHiUS, "Jill Zamzow.atsea"  
<jill.zamzow.atsea@noaa.gov>  
cc  
Subject Fw: Glycerol stocks of bacteria from French Frigate &  
Johnston Atoll

Please see the attached email that Jo-Ann Leong just sent to Greta. I think this will address the issue for all involved.

Athline M. Clark  
Special Projects Program Manager  
Hawaii Division of Aquatic Resources  
Department of Land and Natural Resources  
1151 Punchbowl St. Rm. 330  
Honolulu, Hawaii 96813  
(808) 587-0099 voice  
(808) 587-0115 fax  
Athline.M.Clark@hawaii.gov

----- Forwarded by Athline M Clark/DLNR/StateHiUS on 05/31/06 04:28 PM -----



Jo-Ann Leong  
<joannleo@hawaii.edu>

05/31/06 04:09 PM

Please respond to  
joannleo@hawaii.edu

To guest1.hiialakai@noaa.gov  
cc aulani.wilhelm@noaa.gov, Malia.Chow@noaa.gov,  
chiefsci.hiialakai@noaa.gov, Moani.Pai@NOAA.gov,  
Athline.M.Clark@hawaii.gov, Dominique\_Horvath@fws.gov,  
Domingo.Carvalho@hawaii.gov  
Subject Glycerol stocks of bacteria from French Frigate & Johnston  
Atoll

Dear Greta,

I am asking you to kill all of the bacterial samples that you have collected on this Hiialakai cruise in State of Hawaii, FWS, and Reserve waters. Although I spent the morning obtaining permission from Alan Riggs

EXHIBIT E



to bring those samples to the Halawa quarantine facility, my discussions with the Reserve office and with DAR, lead me to ask you to destroy those samples. The Reserve has talked to Domingo Carvalho and he has told them that the Board doesn't meet until a day after the Hiialakai arrives back in Honolulu. The perception is that you are trying to find loopholes and ways around the process in order to accomplish your goals. The ramifications for HIMB and the rest of the HIMB team if you continue with your sampling, are untenable and I cannot allow this.

We need to put in place a process that will ensure containment of the samples and live assays. I agree with you that trying to find a solution to the coral disease problem is our responsibility and we should be doing this for the state of Hawaii and the people of the Pacific Ocean countries whose coral reefs are being impacted by disease. However, I want you to come back and work with us to develop this quarantine facility and I will send you to French Frigate Shoals at another time. Rusty also goes to Johnson Atoll every other year and you can go on one of those cruises.

There will always be opportunities and although I understand the urgency you feel, you need to stop.

Best regards,

Jo-Ann

Dan A  
Polhemus/DLNR/StateHiUS  
01/02/2007 04:47 PM


To James B Rogers/DLNR/StateHiUS@StateHiUS  
cc  
bcc  
Subject Fw: Samples disposition and debriefing


Blaine -

Still more.

- Dan Polhemus

----- Forwarded by Dan A Polhemus/DLNR/StateHiUS on 01/02/07 04:45 PM -----

Athline M  
Clark/DLNR/StateHiUS  
06/09/06 05:55 PM

To "Jill Zamzow.atsea" <jill.zamzow.atsea@noaa.gov>,  
chiefsci.hiialakai@noaa.gov  
cc Aulani.Wilhelm@noaa.gov, Malia.Chow@noaa.gov,  
joannleo@hawaii.edu, Dan A  
Polhemus/DLNR/StateHiUS@StateHiUS  
Subject Samples disposition and debriefing 

Randy and Jill:

There has been some additional discussion about the disposition of samples and at the end of the day, I have been asked to let you know the outcomes. As the two agency representatives, it will be your task to ensure that these directions are followed.

We are concerned that freezing may not be enough to ensure that the transfer of live material will not occur especially at the microbial or parasite level. Just to be safe and to be clear, all samples that have been frozen and are not currently in any other solution for genetics analysis must be bleached to ensure that there is no transfer of pathogens. This is a policy call and may affect more than one researcher. However, we stand firm and want to assure the public that no live samples were brought into the State nor that there any fear of a transfer. I am so sorry to deliver this message at the 11th hour, but Dan Polhemus does agree with this action, as do others.

In addition, we will need to send letters to all the scientist regarding how the applications were filled out, as not a single one of them indicated that the samples would be transported out of State, and they did NOT actually have permission to do this. We will not send letters of reprimand, merely letters that put them on notice that this should be paid attention to in the future to avoid any issues with legality.

I need to do this all sooner than later and will unfortunately need to debrief with you both as soon as possible after the ship returns. I know you both wanted some time off and both deserve it as well, but I need to request that we meet Tues. morning at DAR at 10 AM. to have this debrief. I realize this might affect some of your plans but it is also critical that we do this while things are still fresh.

Jill I will have my cell phone with me. If 10 AM does not work for you and Randy, please call when you get in and we will figure something out for that day.

mahalo

Athline M. Clark

EXHIBIT F

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